



## 校准证书

CALIBRATION CERTIFICATE

证书编号: J15126902630 号  
Certificate No.

客户名称 Customer	UL LLC
客户地址 Address of customer	12 Laboratory Drive RTP, NC 27709, USA
计量器具名称 Name of Samples	CCD Spectroradiometer Integrating Sphere Compact System
型号 / 规格 Type/Specification	LPCE-3 (LMS-7000)
出厂编号 Series No.	15070001
制造单位 Manufacturer	Lisun Electronics Inc.



批准人 孙晓虹  
Approved by

核验员 徐静婷  
Checked By

校准员 倪华  
Calibrated By

校准日期 2015 年 12 月 20 日  
Date of calibration Year Month Day

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# 上海市质量监督检验技术研究院

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本次计量所依据的技术文件(代号、名称):

Reference documents for the calibration (code, name)

JJG 245-2005 光照度计检定规程

JJG(浙)85-2006 光谱辐射分析仪检定规程

SQI/JL-BD-212 光纤光谱仪的不确定度的评估

JJG(航天)6-1999 直流稳压电源检定规程

SQI/JL-BD-127 直流稳压电源校准不确定度评定

JJG 780 - 1992 交流数字功率表检定规程

JJF(沪)1-2003 数字多用表校准规范

SQI/JL-BD-40 交流数字功率表不确定度评定

QJ 3233-2005 交流稳压电源稳态特性校准规范

SQI/JL-BD-122 交流稳压电源不确定度评估

CTL-OP110 Procedure for Measuring Laboratory Power Source Characteristics

根据说明书技术指标及用户要求校准

计量地点及环境条件:

Location and environmental condition

计量地点: 江月路900号5号楼518室

其它: /

Location

Others

环境温度: 22 °C;

相对湿度: 60 %

Ambient temperature

Relative humidity

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本次计量所使用的主要计量标准器具:

**Main measurement standards used in this verification**

名称/型号 Name/Type	编号 Number	测量范围/准确度 Measuring range/Accuracy	证书编号/有效期限 Certificate No./Due date
谱线光源/HG-1	MACS140601	250nm-930nm /±0.005nm	GXcl2014-2048 /2017-6-22
光谱能量校准灯/SCL-1400	JL-A-A1-3541	1500lm(70W) 1级	GXgd2015-0743 /2016-3-19
光谱仪/USB2000+XR	USB2K+H14148	190nm-1500nm /±0.1nm	J15126000302 /2016-6-19
数字多用表/8508A	46500	DCU:0-1000V /±0.0006% DCI:0-20A /±0.005% ACU:0-1000V /±0.008% (f:40Hz-100kHz) ACI:0-20A(f:40Hz-1kHz) /±0.03% R:0-20GΩ /±(0.002%-0.2%)	2015F11-20-000575/ 2016-2-16
多功能校准仪/5520A	1118009	电压:1V-1000V /±0.03% 电流:0.1mA-20A /±0.05% 功率:0.001W-20000W /±(0.08%-0.20%) 频率:DC-100kHz /±0.01%	2015F11-10-002306/ 2016-10-21
数字功率表/LMG500	05651009	电压:0-1000V /±0.05% 电流:0-30A /±0.05% 功率:0.001W-30000W /±0.05% PF: 0-1 /±0.001 频率:DC-500kHz /±0.01%	2015F14-10-000225/ 2016-1-22
电能质量分析仪/F43	32-02-0	THD (谐波1st-100th):0%-100% /±0.05% ACU:0-1000V /±0.3% ACI:0-3000A /±0.5% ACW:0-3000kVA /±0.8% THD:0-100% /±0.5dB	J15126001097/ 2016-10-7

以上计量标准器具的量值均可溯源到国家基准。

Quantity values of above measurement standards used in this calibration are traced to those of the national primary standards in the P.R. China.

结果/说明:

**Results and additional explanation**

所测数据符合仪器技术要求

数据见后页

本证书提供的结果仅对本次被检(校)样品有效, 未经本院许可, 不得部分采用本证书的内容。

The data are valid only for the Sample(s), Partly using this certificate will not be admitted unless allowed.



结果/说明 (续页):

**Results and additional explanation (continued page)**

本测试系统有以下设备组成

The system consist of devices as below:

1. 光谱仪/Spectroradiometer
2. 积分球/Sphere
3. 直流稳压源/DC Power Source
4. 数字功率表/Degital Power meter
5. 交流电源/AC Power source

1&2. 积分球1.5米直径及光谱仪LMS-7000

1&2. Sphere (Diameter 1.5) & Spectroradiometer LMS-7000

1.外观: 正常

1.Surface : Normal

2.总光通量测量

2.Total light flux measurement

标准值 (lm)/Standard Value (lm)	示值 (lm)/Indicating Value (lm)	误差(%) /Error (%)	不确定度(k=2)/ Uncertainty (k=2)
530.2	533.1	0.5	$U_{rel}=2.4\%$
1159	1165	0.5	$U_{rel}=2.4\%$
6040	6095	0.9	$U_{rel}=2.4\%$

3.色温和色坐标

3.CCT&Chromaticity Coordinates

测试项目/ Item	标准值 (lm)/Standard Value (lm)	示值 (lm)/Indicating Value (lm)	不确定度(k=2)/ Uncertainty (k=2)
色温 (K) / CCT (K)	2907	2908	$U=15K$
色坐标x/ Chromaticity Coordinate x	0.4435	0.4435	$U(x)=0.0040$
色坐标y/ Chromaticity Coordinate y	0.406	0.4062	$U(y)=0.0040$



测试项目/ Item	标准值 (1m)/Standard Value (1m)	示值 (1m)/Indicating Value (1m)	不确定度(k=2)/ Uncertainty (k=2)
色温 (K) / CCT (K)	2888	2890	U=15K
色坐标x/ Chromaticity Coordinate x	0.445	0.4452	U(x)=0.0040
色坐标y/ Chromaticity Coordinate y	0.4059	0.4052	U(y)=0.0040

测试项目/ Item	标准值 (1m)/Standard Value (1m)	示值 (1m)/Indicating Value (1m)	不确定度(k=2)/ Uncertainty (k=2)
色温 (K) / CCT (K)	2947	2945	U=15K
色坐标x/ Chromaticity Coordinate x	0.4407	0.4405	U(x)=0.0040
色坐标y/ Chromaticity Coordinate y	0.4053	0.4051	U(y)=0.0040

#### 4.波长

#### 4. Wavelength

汞灯谱线值/ Value of mercury lamp (nm)	光谱仪示值 /Indicating Value (nm)	不确定度 (k=2)/ Uncertainty (k=2) (nm)
404.656	404	U=1.0
435.833	436	U=1.0
546.074	546	U=1.0
576.960	577	U=1.0
579.066	579	U=1.0

## 5. 积分球涂层反射率

## Coating reflectivity

### 5.Coating reflectivity of Sphere

波长/Wavelength 反射率/reflectivity

(nm) (%)

380 94.5

400 94.6

420 94.8

440 94.8

460 94.7

480 95.0

500 95.1

520 95.5

540 95.5

560 95.8

580 95.9

600 95.5

620 95.6

640 95.7

660 95.2

680 95.6

700 95.2

720 95.1

740 94.8

760 94.8

780 94.7

800 94.5



### 3. 直流稳压源 DC3005S

#### 3.Dc Power source DC3005S

##### 电流测试/Current measurement

示值/Indicating Value	实际值/True Value	误差/Error
0.100 A	0.100 A	0.000 A
0.200 A	0.200 A	0.000 A
0.500 A	0.500 A	0.000 A
0.800 A	0.800 A	0.000 A
1.000 A	1.000 A	0.000 A
2.000 A	2.000 A	0.000 A
3.000 A	3.000 A	0.000 A
5.000 A	5.000 A	0.000 A

##### 电压测试/Voltage measurement

示值/Indicating Value	实际值/True Value	误差/Error
2.000 V	2.000 V	0.000 V
5.000 V	5.000 V	0.000 V
10.000 V	10.001 V	-0.001 V
20.000 V	20.000 V	0.000 V
30.000 V	30.001 V	-0.001 V

纹波/Waveform 2.5mV

功率输出 > 250VA 满载电流稳定度 <0.02% (CC模式)  
 满载电压稳定度 <0.02% (CV模式)

**Output Power > 1500 VA The stability of full load current <0.02% (Constant current)**  
**The stability of full load voltage <0.02% (Constant voltage)**

校准直流电压相对扩展不确定度  $U_{rel}=0.03\%(k=2)$

校准直流电流相对扩展不确定度  $U_{rel}=0.03\%(k=2)$

DC voltage Calibration uncertainty  $U_{rel}=0.02\%(k=2)$

DC current Calibration uncertainty  $U_{rel}=0.02\%(k=2)$



## 4. 数字功率表 LS2008R

### 4. Power meter LS2008R

#### 电压/Voltage

实际值/True value (V)	(50Hz)	(60Hz)	(DC)
	示值/Indicating Value (V)	示值/Indicating Value (V)	示值/Indicating Value (V)
10.0	10.0	/	/
50.0	50.0	/	/
100.0	100.0	/	/
200.0	200.0	/	/
220.0	220.0	220.0	220.0
300.0	300.0	/	/
380.0	380.0	/	/
450.0	449.9	/	/
600.0	600.0	599.9	600.0

#### 电流/Current

实际值/True value (A)	(50Hz)	(60Hz)	(DC)
	示值/Indicating Value (A)	示值/Indicating Value (A)	示值/Indicating Value (A)
0.100	0.100	0.100	0.100
0.200	0.200	/	/
0.500	0.500	/	/
1.000	0.999	/	/
2.000	2.000	/	/
5.000	5.000	/	/
10.00	10.00	10.00	10.00
15.00	15.00	/	/
20.00	20.00	20.00	20.00

#### 频率/Frequency

实际值/True value (Hz)	示值/Indicating Value (Hz)
50.00	50.00
60.00	60.00



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## 功率/Power

电压电流值 /Voltage & Current Value				
	(50Hz)	(60Hz)	(DC)	
	实际值/True value (W)	示值/Indicating Value (W)	示值/Indicating Value (W)	示值/Indicating Value (W)
220V/0.1A/PF=1	22.0	22.0	/	/
220V/0.2A/PF=1	44.0	44.0	/	/
220V/0.5A/PF=1	110.0	110.0	/	/
220V/1A/PF=1	220.0	220.0	/	/
220V/1A/PF=0.5	110.0	110.0	/	/
220V/1A/PF=-0.5	110.0	110.0	/	/
220V/2A/PF=1	440.0	439.9	/	/
	(kW)	(kW)	(kW)	(kW)
220V/5A/PF=1	1.100	1.100	/	/
220V/10A/PF=1	2.200	2.200	/	/
220V/20A/PF=1	4.400	4.400	4.399	4.400
600V/20A/PF=1	12.00	12.00	12.00	12.00
450V/20A/PF=1	9.000	9.000	9.000	8.999
380V/20A/PF=1	7.600	7.598	7.598	7.600
100V/20A/PF=1	2.000	2.000	2.000	2.000
50V/20A/PF=1	1.000	1.000	1.000	1.000

PF(100V/1A@50Hz)

	(50Hz)	(60Hz)
实际值/True value	示值/Indicating Value	示值/Indicating Value
1.0000	1.000	1.000
0.8000C	0.800	/
0.5000C	0.500	/
0.5000L	0.500	0.500
0.3000C	0.300	0.300
0.1000C	0.100	/
0.1000L	0.100	/

本次校准电压扩展不确定度  $U_{rel}=0.15\%(k=2)$

本次校准电流扩展不确定度  $U_{rel}=0.15\%(k=2)$

本次校准功率扩展不确定度  $U_{rel}=0.15\%(k=2)$

Voltage Calibration Uncertainty  $U_{rel}=0.06\%(k=2)$

Current Calibration Uncertainty  $U_{rel}=0.06\%(k=2)$

Power Calibration Uncertainty  $U_{rel}=0.06\%(k=2)$

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交流电源 LSP-500VAS

Power source LSP-500VAS

纯阻性负载测试

Test under resistive load

Rated Voltage (V)	Rated Frequency (Hz)	Open Circuit				With Load			
		Item	Code	True Value	Unit	Item	Code	True Value	Unit
220	60	Max Voltage	V <sub>oc,max</sub>	120.0	V	Max Voltage	V <sub>ld,max</sub>	120.0	V
		Min Voltage	V <sub>oc,min</sub>	119.9	V	Min Voltage	V <sub>ld,min</sub>	119.8	V
		Stability	Reg <sub>v,oc</sub>	0.08	%	Stability	Reg <sub>v,ld</sub>	0.17	%
						Max Current	I <sub>ld,max</sub>	3.50	A
						Min Current	I <sub>ld,min</sub>	0.00	A
		Max Frequency	F <sub>oc,max</sub>	60.00	Hz	Max Frequency	F <sub>ld,max</sub>	60.00	Hz
		Min Frequency	F <sub>oc,min</sub>	60.00	Hz	Min Frequency	F <sub>ld,min</sub>	60.00	Hz
		Stability	Reg <sub>f,oc</sub>	0.00	%	Stability	Reg <sub>f,ld</sub>	0.00	%
		Max Harmonic distortion rate	THD <sub>oc</sub>	0.3	%	Max Harmonic distortion rate	THD <sub>ld</sub>	0.4	%

Rated Voltage (V)	Rated Frequency (Hz)	Open Circuit				With Load			
		Item	Code	True Value	Unit	Item	Code	True Value	Unit
150	60	Max Voltage	V <sub>oc,max</sub>	150.0	V	Max Voltage	V <sub>ld,max</sub>	150.1	V
		Min Voltage	V <sub>oc,min</sub>	150.0	V	Min Voltage	V <sub>ld,min</sub>	149.9	V
		Stability	Reg <sub>v,oc</sub>	0.00	%	Stability	Reg <sub>v,ld</sub>	0.07	%
						Max Current	I <sub>ld,max</sub>	3.50	A
						Min Current	I <sub>ld,min</sub>	0.00	A
		Max Frequency	F <sub>oc,max</sub>	60.00	Hz	Max Frequency	F <sub>ld,max</sub>	60.00	Hz
		Min Frequency	F <sub>oc,min</sub>	60.00	Hz	Min Frequency	F <sub>ld,min</sub>	60.00	Hz
		Stability	Reg <sub>f,oc</sub>	0.00	%	Stability	Reg <sub>f,ld</sub>	0.00	%
		Max Harmonic distortion rate	THD <sub>oc</sub>	0.3	%	Max Harmonic distortion rate	THD <sub>ld</sub>	0.3	%

Rated Voltage (V)	Rated Frequency (Hz)	Open Circuit				With Load			
		Item	Code	True Value	Unit	Item	Code	True Value	Unit
220	50	Max Voltage	V <sub>oc,max</sub>	220.1	V	Max Voltage	V <sub>ld,max</sub>	220.2	V
		Min Voltage	V <sub>oc,min</sub>	220.0	V	Min Voltage	V <sub>ld,min</sub>	219.9	V
		Stability	Reg <sub>v,oc</sub>	0.05	%	Stability	Reg <sub>v,ld</sub>	0.09	%
						Max Current	I <sub>ld,max</sub>	2.00	A
						Min Current	I <sub>ld,min</sub>	0.00	A
		Max Frequency	F <sub>oc,max</sub>	50.00	Hz	Max Frequency	F <sub>ld,max</sub>	50.00	Hz
		Min Frequency	F <sub>oc,min</sub>	50.00	Hz	Min Frequency	F <sub>ld,min</sub>	50.00	Hz
		Stability	Reg <sub>f,oc</sub>	0.00	%	Stability	Reg <sub>f,ld</sub>	0.00	%
		Max Harmonic distortion rate	THD <sub>oc</sub>	0.2	%	Max Harmonic distortion rate	THD <sub>ld</sub>	0.4	%

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Rated Voltage(V)	Reated Frequency(Hz)	Open Circuit				With Load			
		Item	Code	True Value	Unit	Item	Code	True Value	Unit
240	50	Max Voltage	V <sub>oc,max</sub>	240.1	V	Max Voltage	V <sub>ld,max</sub>	240.1	V
		Min Voltage	V <sub>oc,min</sub>	239.9	V	Min Voltage	V <sub>ld,min</sub>	239.9	V
		Stability	Reg v,oc	0.04	%	Stability	Reg v, ld	0.04	%
						Max Current	I <sub>ld, max</sub>	2.00	A
						Min Current	I <sub>ld min</sub>	0.00	A
		Max Frequency	F <sub>oc,max</sub>	50.00	Hz	Max Frequency	F <sub>ld,max</sub>	50.00	Hz
		Min Frequency	F <sub>oc,min</sub>	50.00	Hz	Min Frequency	F <sub>ld, min</sub>	50.00	Hz
		Stability	Reg f,oc	0.00	%	Stability	Reg f, ld	0.00	%
Max Harmonic distortion rate	THD <sub>oc</sub>	0.3	%	Max Harmonic distortion rate	THD <sub>ld</sub>	0.3	%		

Rated Voltage(V)	Reated Frequency(Hz)	Open Circuit				With Load			
		Item	Code	True Value	Unit	Item	Code	True Value	Unit
240	60	Max Voltage	V <sub>oc,max</sub>	240.2	V	Max Voltage	V <sub>ld,max</sub>	240.2	V
		Min Voltage	V <sub>oc,min</sub>	240.0	V	Min Voltage	V <sub>ld,min</sub>	239.9	V
		Stability	Reg v,oc	0.08	%	Stability	Reg v, ld	0.08	%
						Max Current	I <sub>ld, max</sub>	2.00	A
						Min Current	I <sub>ld min</sub>	0.00	A
		Max Frequency	F <sub>oc,max</sub>	60.00	Hz	Max Frequency	F <sub>ld,max</sub>	60.00	Hz
		Min Frequency	F <sub>oc,min</sub>	60.00	Hz	Min Frequency	F <sub>ld, min</sub>	60.00	Hz
		Stability	Reg f,oc	0.00	%	Stability	Reg f, ld	0.00	%
Max Harmonic distortion rate	THD <sub>oc</sub>	0.2	%	Max Harmonic distortion rate	THD <sub>ld</sub>	0.4	%		

## 读数显示测试/Indicating Value test

电压(50Hz) Voltage(50HZ)	示值/Indicating Value (V)	实际值 /True value (V)	频率 Frequency	示值/Indicating Value (Hz)	实际值 /True value (Hz)
	80.0	79.9		50.0	50.00
	100.0	99.8		60.0	60.00
	120.0	119.8			
	220.0	220.0			
	240.0	239.7			
	260.0	259.6			

电流(50Hz) Current (50HZ)	示值/Indicating Value (A)	实际值 /True value (A)
	0.500	0.499
	1.000	0.998
	2.000	1.998
	4.000	4.000

本次校准交流电压绝对扩展不确定度  $U=0.2V(k=2)$   
 本次校准交流电流绝对扩展不确定度  $U=0.2A(k=2)$   
 本次校准失真度绝对扩展不确定度  $U=0.1\%(k=2)$   
 本次校准频率绝对扩展不确定度  $U=0.02Hz(k=2)$   
 AC Voltage Calibration Uncertainty  $U=0.2V(k=2)$   
 AC Current Calibration Uncertainty  $U=0.2A(k=2)$   
 Distortion Factor Calibration Uncertainty  $U=0.1\%(k=2)$   
 Frequency Calibration Uncertainty  $U=0.02Hz(k=2)$

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